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ABSTRACT

This document is an instructional module package prepared in objective form for use by an instructor familiar with inventory records, purchasing and budgeting for water and wastewater treatment plants. Included are objectives, instructor guides, student handouts, and transparency masters. The module considers methods of inventory control, proper purchasing procedures and building and living within a budget. (Author/BH)

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FINANCIAL

Training Module 4.310.3.77

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September, 1977

SE 024 142

SUMMARY

Module No:	Module Title: Finance
	Submodule Title: 1. Inventory Records 2. Purchasing 3. Budgeting
Approx. Time: 24 hours	Topic: Summary

Objectives:

Upon completion of this module, the participant will be able to:
1. Keep adequate materials & supplies inventory records.
2. Prepare work orders, purchase requisitions and purchase orders.
3. Determine the best method of purchasing from one supplier or on competitive bid.
4. Budget for materials, supplies and expenses on a yearly basis.

Instructional Aids:
Handouts
Transparencies

Instructional Approach:
Lecture
Discussion

References:

1. Water Utility Accounting, American Waterworks Assocation & Municipal Finance Officers Association, 1970.
2. Accounting Principles, Niswonger & Fess, South-Western Publishing Company, 1977.
3. Accounting Principles, Pyle & White, Irwin Publishing, 1976.
4. Water Utility Management, American Waterworks Association, 1959.
5. "Simplified System of Accounts for Municipally Owned Water Utilities", American Waterworks Association, 1963.

Class Assignments:
Read handouts. Prepare inventory records, purchasing information, and budgets from handouts.

Module No:	Module Title: Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Summary of Submodule

Overall Objectives:
Upon completion of this submodule, the participant will be able to:
1. Determine the most appropriate method of keeping inventory.
2. Keep track of inventory on a perpetual basis using inventory cards.
3. Determine the proper level of inventory using economic order quantity.
4. Determine the better method of replenishing inventory, either competitive bidding or purchasing from a single supplier.

Instructional Aids:
Transparencies - FT-1 through FT-7
Handouts - Information on Inventories
Information on E.O.Q.
Information on Bidding vs. Purchasing
Inventory Cards

Instructional Approach:

Lecture

Discussion

References:
1. Water Utility Accounting
2. Niswonger & Fess
3. Pyle & White

Class Assignments:

Read informational handouts - FH-1 through FH-5.

Prepare inventory cards.

Module No:	Module Title: Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Inventory Methods

Objectives:

1. The participant will discuss, either orally or briefly in writing, the importance of adequate inventory records.
2. The participant will discuss, either orally or briefly in written form, the concept of a perpetual inventory as it applies to materials and supplies.
3. The participant will recognize the other methods of recording inventory, basically periodic and grouping.
4. The participant will list at least 5 advantages of a perpetual inventory over a periodic inventory, for materials and supplies.

Instructional Aids:

Transparencies FT-1 and FT-2

Handout FH-1, Inventory Methods.

Instructional Approach:

Lecture

Discussion

References:

1. Niswonger & Fess
2. Pyle & White
3. Water Utility Accounting

Class Assignments:

Read Handout FH-1

Module No: Finance Inventory - 1	Topic: Inventory Methods	
Instructor Notes:		Instructor Outline:
Distribute FH-1 (the day before if possible) Transparencies on Periodic Inventory, FT-1		I. Reason for Inventory A. Matching costs and budget. 1. Must keep track of what expenses are in order to keep within budget. 2. Must have cost of materials and supplies in the correct accounting period for accuracy. B. Control of materials and supplies 1. Must count in order to see where each item goes. 2. Must record purchases and uses so each job can be documented. C. Governmental requirements- To qualify for government funding, proper records must be kept. D. Materials and supplies II. Methods of Recording Inventory A. Periodic Inventory 1. Done only occasionally - usually once a year. 2. Always done at the beginning of the year. 3. Actually count items. a. Can estimate some things ie. yards of pipe - but must be very good estimates. b. Often physical count is done or witnessed by an uninterested third party to insure accuracy. 4. Advantages of periodic inventory. a. Easy - done only occasionally.

Module No: Finance Inventory - 1	Topic: Inventory Methods	
Instructor Notes:		Instructor Outline:
		b. Is always a part of any other inventory. 5. Disadvantages of periodic inventory. a. Hard to tell whether there is loss from breakage or pilferage during the middle of the year. b. Encourages employees to be careless - because no one is checking, it is easier to be wasteful. c. Is less responsive to needs - difficult to plan for next year from this year.
Transparency on Perpetual Inventory, FT-2.		B. Perpetual Inventory 1. Kept all the time - every time things are bought or used. 2. Must also count items on a yearly basis (as in periodic - see above). 3. Use inventory cards to keep track of quantities. 4. Advantages of perpetual inventory. a. Always know how much of each item. b. Easy to determine when to replenish stock. c. Creates better control over items of inventory. d. Encourages employees to be careful about consumption. e. Easier to plan for future years, especially for seasonally used items. 5. Disadvantages of perpetual inventory.
Any examples from instructors or from participants would be helpful.		

Module No: Finance Inventory - 1	Topic: Inventory Methods	
Instructor Notes:		Instructor Outline:
During discussion, poll the participants to see what method is being used.		a. Time-consuming. b. Must develop incentive in employees to have them cooperate. C. Grouping of Inventory Items 1. Many items of inventory similar in nature. 2. Items of small quantity and consumption are bothersome to keep track of separately. 3. Grouping declassifies individual items in favor of simplicity. 4. Steps in grouping: a. List all items of inventory. b. Determine which items in the list are similar enough to record together c. Record on one inventory card the assortment to be grouped. d. When items in this group are used in general course of work, the inventory is decreased by the appropriate number. e. Costs are averaged on a weighted average basis. D. Averaging Costs is Most Common.

Module No:	Module Title: Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Inventory Cards

Objectives:

1. The participant will define the purpose of an inventory card, either orally or in writing.
2. The participant will identify and explain the purpose of the following items on an inventory card:
   1. item number
   2. item name
   3. item specifications
   4. sources
   5. balance
   6. date received-cost per unit-#received
   7. date used - number used
   8. usage to date
   9. economic order point
   10. economic order quantity

Instructional Aids:

Handouts - FH-2, examples of several inventory cards.

Transparencies - FT-3 & FT-4

Instructional Approach:

Lecture

Discussion

References:

1. Niswonger & Fess
2. Pyle & White
3. Water Utility Accounting

Class Assignments:

Complete inventory cards (optional)

Module No: Finance Inventory - 2	Topic: Inventory Cards	
Instructor Notes:		Instructor Outline:
It is important to have as many samples of actual inventory cards as possible. Participants should be strongly encouraged to bring cards from their own plant to use as examples and tools of learning. Instructor might request samples of inventory cards several days in advance so that they might be copied for all participants. Attached examples are courtesy of plant managers in Emmetsburg and Spencer, Iowa. Use examples - Transparencies FT-3 & FT-4 and write in an example with a transparency pen.		I. Purpose of Inventory Card A. Must have standard method of recording quantities. B. Need a place to record all the specifications of each item. C. Must have a place to record purchases of items and when items are used. D. Used to encourage proper organization of inventory. II. Elements of an Inventory Card. A. Item number - each item should have a local control number for convenience (and sometimes machine recording 1. Develop number system - usually 4 or 5 digits. 2. Group inventory by number into sections according to purpose for ease in finding. 3. Have a list of item numbers and identification seperate from inventory file as a cross-reference. B. Item Name - use a descriptive name - ie. size 10" sewertile, 5' length. 1. Be careful to be very specific. 2. Avoid unnecessary abbreviations - you need only write this once or twice, so make it easy to understand.

Module No: Finance Inventory - 2	Topic: Inventory Cards	
Instructor Notes:		Instructor Outline:
Note: not all of the elements explained are present on all inventory cards.		C. Item specifications - any quality, restrictions, etc must be recorded. D. Sources - list names and addresses of all companies where the materials or supplies can be purchased (and last cost estimate). E. Balance - how many, both in cost and in number, are left on the current date. 1. If each purchase is recorded and each use is recorded, the balance remains the same between uses. 2. Balance in cost is not as important as number, especially for budgeting. F. Date received - cost per unit - when new items are purchased, record the number and cost as of the date it is received, not ordered. 1. Inventory should be recorded on the card when it is received because you cannot use it until it arrives. 2. Sometimes cost per unit is per pound or per foot, sometimes it is per item. G. Date used - recorded on inventory card from work order. 1. Cost per unit used is on standard cost, usually an average. 2. Number used is subtracted from previous balance.

Module No: Finance Inventory - 2	Topic: Inventory Cards	
Instructor Notes:		Instructor Outline:
At this point, examples and/or problems could be completed.		H. Usage to date - how many have you used this year - used for budgets. I. Economic order point - at what level should new items be ordered - determined in next module. J. Economic order quantity - how many should you order- next module.

Module No:	Module Title: – Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Economic Order Point and Economic Order Quantity

Objectives:

1. The participant will recognize the definition of "economic order point" in relation to ordering items of inventory.
2. The participant, given the appropriate data, will calculate the economic order point of several items of inventory.
3. The participant will recognize the definition of "economic order quantity" in relation to ordering items of inventory.
4. The participant, given the appropriate data, will calculate the appropriate economic order quantity of several items of inventory.

Instructional Aids:

Handout on Economic Order Point and Economic Order Quantity.

Transparencies FT-6 & FT-7.

Instructional Approach:

Lecture

Discussion

References:

1. Niswonger & Fess
2. Pyle & White
3. Water Utility Accounting

Class Assignments:

Read handout FH-3.

Module No: Finance Inventory - 3	Topic: Economic Order Point and Economic Order Quantity	
Instructor Notes:		Instructor Outline:
Clarify with example 1.		I. Introduction A. Some plants have unlimited cheap storage space. B. Plants with limited storage muct learn how much and when to order. II. Economic Order Point A. Lag time for order. 1. The longer the time to get an item, the sooner you must order. 2. You must build in ordering problems. a. Some companies more prompt than others. b. Transportation difficulties - strikes, etc. B. Rate of use. 1. From last year, determine how many or how much per week on an average. 2. From last month, determine if this year's rate is different. 3. Remember to take seasonal variances into account. C. Record on inventory card - can be used for a long time unless circumstances change. III. Economic Order Quantity A. How much does it cost to order? 1. Initial cost goes up in inflationary times, so the earlier your order, the cheaper it is. 2. Discount for larger quantities can make them cheaper.

Module No: Finance Inventory - 3	Topic: Economic Order Point and Economic Order Quantity

Instructor Notes:	Instructor Outline:
	3. Costs of ordering are usually the same no matter what the size of the order. Therefore, the more times you order, the more it costs. B. How much does it cost to store? 1. Outside storage is free. 2. Storage in a building costs - a. Utilities b. Interest (mortgage) c. Taxes 3. Storage costs in lack of ability to use the space for something else. C. How many per year do you use? 1. Look at last year's amount. 2. Project increased usage. D. Examples 1. Tabulation - you can calculate how many to buy by calculating many sizes of orders. a. Time consuming for many items of inventory. b. Unnecessary. 2. Formula does same thing. E. Record on inventory card.
EOQ $= \sqrt{\frac{2 \times \text{Annual Units Req.} \times \text{Cost/Order}}{\text{Storage cost per unit}}}$	
Note to Instructor: Don't let the formula upset anyone. Most pocket calculators have the square root function, so that the actual calculation isn't difficult. Also don't try to explain why the formula works - it isn't worth the effort.	IV. Justification of Calculations A. To run out of most materials & supplies would be be disasterous. Therefore economic order point must be used. B. To store items for a long time inconveniently is very frustrating, as well

Module No: Finance Inventory - 3	Topic: Economic Order Point and Economic Order Quantity	
Instructor Notes:		Instructor Outline:
Note to Instructor: To use Economic Order Point & Economic Order Quantity is an ideal situation. Many small plant operators, especially those that must do everything themselves, this will seem like too much "busy work". It is your responsibility to encourage operators to make some reasonable effort to determine economic order point & economic order quantity, even if they are only "seat of the pants" estimates. Many operators don't realize that they just "know" many things that their successors don't know.		as costly. Economic order quantity eliminates this.

Module No: –	Module Title: Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Competitive Bidding vs. Purchasing

Objectives:

1. The participant will list the advantages and disadvantages of purchasing items for inventory from a competitive bid.
2. The participant will list the advantages and disadvantages of purchasing from one supplier.
3. The participant will list with 100% accuracy the specifications needed, given several inventory cards, to ask several suppliers for bids on items of inventory.
4. The participants will, with 100% accuracy, write a purchase order or letter intended to order materials as needed from several inventory cards.

Instructional Aids:

Handouts on Competitive Bidding and Purchasing.

Instructional Approach:

Lecture

Discussion

References:

1. Niswonger & Fess
2. Pyle & White
3. Water Utility Accounting

Class Assignments:

Read handout FH-4.

Module No: Finance Inventory - 4	Topic: Competitive Bidding vs. Purchasing	
Instructor Notes:		Instructor Outline:
		I. Introduction - from whom should you buy? A. Public relations - available locally? B. Cost - where is it least expenxive? C. Convenience - where is it most readily available? II. Competitive Bids A. Advantages 1. Usually get things cheaper 2. Bulk lots more convenient for ordering and receiving 3. Very good for the beginning of the year - inventory is low, many supplies ordered at once. B. Disadvantages 1. Repetitive orders are cumbersome, both for your and for suppliers. 2. Much slower process (letter requesting bids - bids received - held to closing date - lowest bid determined - materials & suppliers ordered.) III. Purchasing from catalog or price list. A. Advantages 1. Easy - can be done rapidly 2. Can be checked once a year and best supplier recorded on inventory card. B. Disadvantages 1. Must order more times - separate orders for each item. 2. Don't always get lowest price. IV. Important to use something.

*Optional Page - for small plant operators only.

Module No:	Module Title: Finance
	Submodule Title: Inventory Records
Approx. Time:	Topic: Small Plant Operations

Objectives:

Instructional Aids:

Handout on Small Plant Operations.

Instructional Approach:

Lecture

Discussion

References:

1. Niswonger & Fess
2. Pyle & White
3. Water Utility Accounting

Class Assignments:

Read handout FH-5.

Module No: Finance Inventory - 5	Topic: Small Plant Operations	
Instructor Notes:		Instructor Outline:
		I. Justification of systems A. Perpetual Inventory 1. No different, except on a smaller scale. 2. Must always do physical inventory, in any case. B. Inventory Cards 1. More likely to be manual than machine or computer operated. 2. Can be kept by operator or bookkeeper. 3. Tight budgets usually allow for less loss. C. Economic Order Point & Economic Order Quantity 1. Must work harder to take advantage of any savings. 2. Lower inventory levels - easier to run out if EOP isn't watched. 3. Can be less scientific, but is still necessary. D. Bid or Purchase 1. Able to take advantage of discounts. 2. Sometimes bidding can work to advantage. II. Conclusion A. Essential to maintain system. B. "One-person" operation can create chaos. 1. If you quit. 2. If you must justify numbers that are in your head.

Module No:	Module Title: Finance
	Submodule Title: Purchasing
Approx. Time:	Topic: Summary of submodule

Overall Objectives:

Upon completion of this submodule, the participant will be able to:
1. Demonstrate the use of the work order in inventory control.
2. Complete a purchase requisition.
3. Complete a purchase order.

Instructional Aids:
Transparencies
Handouts - Information on controlling purchasing using work orders, purchase requisitions and purchase orders
Work Orders
Purchase Orders
Purchase Requisitions

Instructional Approach:

Lecture

Discussion

References:
Water Utility Accounting
Niswonger & Fess
Pyle & White

Class Assignments:

Read informational handouts.

Prepare work orders, purchase requisitions & purchase orders.

Module No:	Module Title: Finance
	Submodule Title: Purchasing
Approx. Time:	Topic: Work Orders

Objectives:

1. The participant will define the purpose of a work order, either orally or briefly in writing.
2. The participant will identify and expalin the purpose of the following items on a work order:
   1. date
   2. item number
   3. quantity used
   4. job number or name
   5. authorization
3. The participant will list at least 5 advantages of the work order system of materials distribution.
4. The participant, given several inventory cards and several work orders, will record on the inventory cards the information as necessary from the work order.
5. The participant will discuss, either orally or briefly in writing, the methods of encouraging employees to use the work order system effectively.

Instructional Approach:	Instructional Aids:
Lecture	Handouts of Work Orders FH-6
Discussion	Transparencies - FT-8 and FT-9

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handouts.

Module No: Finance Purchasing - 1	Topic: Work Orders	
Instructor Notes:		Instructor Outline:
Note to instructor: Participants should be strongly encouraged to bring work orders from their own plants to use as examples. Instructor might request samples of work orders in advance so they might be copied for all participants. (Also make transparencies.) FT-8 & FT-9 Note to instructor: This and the following units in the purchasing submodule have no written participant handouts. Because a great deal of the information in this submodule varies with the type of system the participant must deal with. The instructor can therefore modify the unit accordingly.		I. Purpose of a Work Order A. Organization 1. Always keeps inventory records up-to-date. 2. Keeps the costs of different jobs separate. B. Control 1. Prevents usage of materials without record. 2. Encourages employees to use materials more carefully.* II. Items on Work Order A. Date - necessary for internal control, so that inventory records are up-to-date. B. Item number - the inventory number is much shorter and more convenient to use than an item description. C. Quantity used - the number actually used, including any ruined on the job. D. Job number or name - always use a job number or name system so that items are charged out properly. E. Authorization - have work order signed or initialed by two people. (Prevents using items of inventory improperly.) III III. Advantages of Work Order System A. Makes distribution of jobs simple. 1. As each job comes in, it can be written on a work order - then the work

*Copies - usually several, often different colors
1. Inventory control 2. Job costing 3. In numerical order - to account for each assignment

Module No: Finance Purchasing - 1	Topic: Work Orders (con't.)	
Instructor Notes:		Instructor Outline:
		orders are given to employees. 2. Makes it easier to remember jobs - hard to forget ir they're written down. B. Makes keeping inventory simple 1. On a daily or weekly basis, usage of materials and supplies can be transferred from work order to inventory card. 2. Coding makes inventory simple. C. Makes cost assignments simple 1. Each job has groups of work orders, so that materials used on that job can be charged to that job. 2. No job can be forgotten if it has work orders. D. Gives check on employees 1. They can't take materials and supplies without lying about where they're used. 2. You can see each day what they've done by reviewing work orders. E. Gives permanent record 1. Substiantiates your position to others. 2. Records available for budgeting.
Use transparencies to transfer information to Inventory Card from Work Order. Use examples gleaned from participants.		IV. Transfer relevant information from work order to inventory card. (Use inventory cards from Submodule 1 - Inventory.)

Module No: Finance Purchasing - 1	Topic: Work Orders (con't.)	
Instructor Notes:		Instructor Outline:
Note: This is a good place to have discussion from participants.		V. Employee relations A. Can be difficult to get employees to use work orders. B. Suggestions 1. Don't let them get anything without a work order. 2. Make them responsible for inventory which is missing. 3. Remind then that work orders protect them - substiantiate what they have done.

Module No: –	Module Title: Finance
	Submodule Title: Purchasing
Approx. Time:	Topic: Purchase Requisitions

Objectives:

1. The participant will define the term "purchase requisition" and differentiate it from the terms "purchase order" and "work order."
2. The participant will identiry and explain the purpose of the following items on a purchase requisitions:
   1. date
   2. item number
   3. item name
   4. description
   5. number needed
   6. authorization
   7. suppliers - sources
3. The participant, given the appropriate information from inventory cards, will prepare a purchase requisition for approval.

Instructional Aids:

Handouts - purchase requisitions FH-6 page 1 & FH-7
Transparencies - FT-8, FT-10 & FT-11

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handouts.

Module No: Finance Purchasing - 2	Topic: Purchase Requisition	
Instructor Notes:		Instructor Outline:
Transparencies - FT-8 (bottom) FT-10 FT-11 Use participant's examples - be sure to differentiate from Purchase Orders.		I. Definition of Purchase Requisition A. In-house record 1. For use of employees only 2. Lets employees show manager the need for items of inventory. 3. Good double check for perpetual inventory system (EOP). B. Record for board 1. For use of manager to request purchases of board or governing unit. 2. For record of needs - use for budgeting. II. Differences in Purchase Requisitions, Purchase Orders & Work Orders A. Work Order - used to order parts from existing inventory supplies. B. Purchase Requisition - used to identify the need for items of inventory. C. Purchase Order - used to order new items of inventory from suppliers. III. Items on Purchase Requisitions A. Date - date the items are seen to be needed. B. Item Number - from inventory record. C. Item Name - title from inventory card. D. Description - specifications needed to order. E. Number needed - Economic Order Quantity

Module No: Finance Purchasing - 2	Topic: Purchase Requisition (con't.)	
Instructor Notes:		Instructor Outline:
		F. Authorization - Manager should always review inventory to verify. G. Suppliers - Sources - from inventory cards.
Use example from card transparencies from previous unit.		IV. Example of how to use a purchase requisition.

Module No:	Module Title: – Finance
	Submodule Title: Purchasing
Approx. Time:	Topic: Purchase Orders

Objectives:

1. The participant will identify and explain the purpose of the following items on a purchase order:
   1. date
   2. item name
   3. order number
   4. address of supplier
   5. shipping address
   6. manufacturer's item number
   7. quantity
   8. authorization
2. Given the purchase requisition, the participant will, with 100% accuracy, complete a purchase order.
3. The participant will discuss the importance of completing purchase orders, either orally or in writing.

Instructional Aids:

Handout - Purchase Orders - FH-8

Transparencies - FT-12 & FT-13

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handouts.

Module No: Finance Purchasing - 3	Topic: Purchase Orders	
Instructor Notes:		Instructor Outline:
Use participant's samples FT-12 & FT-13		I. Purpose of items on purchase order A. Date - date of order. B. Item Name - as in suppliers catalog. C. Order Number - all p.o.'s should be pre-numbered so you don't forget you've ordered something. D. Address of supplier - where you will send order. E. Shipping address - where do you want them to send the order? F. Manufacturer's item number as in supplier's catalog. G. Quantity - how many do you want? (be sure you use the appropriate unit - ie. feet pounds, etc.) H. Authorization - signature of City Clerk, Board Presidents, etc.
Use tranpsrancies and purchase requisitions from previous unit and examples as brought.		II. Example of how to use a purchase order. A. Record of what you order. B. Complete, easy method to order, especially when you have no order form from supplier. C. Standardization makes it simple to understand.

Module No:	Module Title: Finance
	Submodule Title: Budgeting
Approx. Time:	Topic: Summary of Submodule

Objectives:

Upon completion of this submodule, the participant will be able to use historical eveidence, average cost, and an escallation factor to develop a yearly budget for:

1. Materials and supplies.
2. Labor.
3. Other Expenses.

Instructional Aids:

Transparencies

Handouts - Information on historical evidence.
Information on averaging.
Information of inflationary factors.

Instructional Approach:

Lecture

Discussion

References:

Water Utility Accounting
Niswonger & Fess
Pyle & White

Class Assignments:

Read informational handouts.

Prepare budgets.

Module No:	Module Title: Finance
	Submodule Title: Budgeting
Approx. Time:	Topic: Capital Expansion

Objectives:

1. The participant will discuss briefly orally or in written form, the purpose of a budget, especially as it relates to a plant manager.
2. The participant will define the term "capital expansion" as it applies to budgeting for one year, either orally or in writing.
3. The participant will list at least 10 different items of captial expansion which might affect an operating budget.
4. The participant will explain, either orally or in writing, the effect of capital expansion on historical evidence.

Instructional Aids:

Handout on capital expansion - FH-9.

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handout.

Module No: Finance Budgeting - 1	Topic: Capital Expansion	
Instructor Notes:		Instructor Outline:
1. Average capital expenditure growth - get a %. Multiply the % by this year's expenditure. 2. Estimate increase - find out from city planners. Add to base from #1. 3. Look at last year - any extraordinary expenditures? Subtract from answer #2. 4. Take #3 and subtract last year's expenditures - then take last year's expenditures into the result - this % is your escallation factor. See handout FH-9 for example.		I. Purpose of a Budget A. Essential to organized growth. B. Estimate of the future. 1. "Budget" - one year or less. 2. "Plan" or "Forecast" - long term (5-10 years) C. Budgets create goals. D. Budgets create guidelines for spending. E. Budgets help managers control employees. F. Budgets comply with governmental regulations. II. Theory of a governmental budget A. Fixed income - not controllable. B. Fixed money available to use for costs - budgets control that money. III. Capital Expansion A. Definition - an increase in income - producing assets in order to increase revenues. B. Must be planned for future but based on the past - historical evidence. C. Must be permanent - not just repairing existing facilities, but creating new ones. D. Be sure you check the past to see if there is anything that does not apply to the future - "extraordinary expenditures."

Module No:	Module Title: Finance
	Submodule Title: Budgeting
Approx. Time:	Topic: Materials and Supplies

Objectives:

1. The participant will recognize the definitions of the following terms as they apply to planning:
   1. historical evidence
   2. average cost
   3. escallation factor
2. The participant will discuss the difficulties of forecasting materials and supplies costs by using only historical evidence.
3. Using historical evidence, the participant will determine mathematically the estimated amount of a given group of materials or supplies necessary for one year.
4. Using historical evidence, average cost, and an escallation factor, the participant will determine the estimated cost of the materials determined in objective 3.

Instructional Aids: Handout on historical evidence, average cost & escallation. Handouts on prior years materials & supplies cost. FH-10

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handouts.

Prepare materials & supplies budgets.

Module No: Finance Budgeting - 2	Topic: Materials & Supplies	
Instructor Notes:		Instructor Outline:
See handout FH-10 for examples.		I. 3 steps to budgeting: A. Historical evidence - how much did you use last year? 1. Units used 2. Cost of units B. Change in cost - did the per unit cost increase? cost at end of year - cost at beginning of year change ÷ 2 = average cost average cost + last year's cost budgeting cost C. Units used x escallation factor = increase in units used. Increase in units used + last year's units used = budgeting units. D. Budgeting units x budgeted cost = Materials and Supplies Budget, 1977-78.

Module No:	Module Title: Finance
	Submodule Title: Budgeting
Approx. Time:	Topic: Labor

Objectives:

1. The participant will discuss either orally or in writing the impact of the escallation factor on labor costs.
2. Using the concepts of historical evidence and the escallation factor, and given the appropriate information, the participant will determine the estimated cost of labor for one year.

Instructional Aids:

Handout on labor costs FH-11.

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handout.

Prepare labor budgets.

Module No: Finance Budgeting - 3	Topic: Labor	
Instructor Notes:		Instructor Outline:
Notes: "Labor" denotes hourly plant workers, not administrative or office help. The escallation factor is not always valid for labor, especially if increased capital expenditures create more overtime pay, be sure to mention this as a factor in labor budgeting. Labor cost includes the cost of fringe benefits (ie. FICA, Insurance, etc.) in addition to straight hourly wage.		I. Steps A. Historical evidence - how many hours, at what average cost per hour, did you use last year? B. Cost increase - new labor contract or inflation increase - add to old rate. (Usually very fixed - little control by managers over labor rates.) C. Hours increase - be sure to add in new employees - if no new employees, use escallation factor. D. Hours increase + last year's hours = budgeted hours. Cost increase + last year's cost = budgeted cost. E. Budgeted hours x budgeted cost = labor budgeted, 1977-78. F. Might build in "buffer" for emergency work, overtime, etc., just to be safe.

Module No:	Module Title: Finance
	Submodule Title: Budgeting
Approx. Time:	Topic: Other Expenses

Objectives:

1. The participant will recognize from a list of accounts those expense accounts which vary with plant operations.
2. The participant will recognize from a list of accounts those expense accounts which are fixed from year to year, or which are predetermined for one year.
3. Using historical evidence, average cost, and the escallation factor, and fiben the appropriate date, the participant will determine the estimated other expenses, both fixed and variable, for one year.

Instructional Aids:

Handout on other expenses - FH-12.

Instructional Approach:

Lecture

Discussion

References:

Niswonger & Fess
Pyle & White
Water Utility Accounting

Class Assignments:

Read handout.

Prepare other expenses budgets.

Module No: Finance Budgeting - 4	Topic: Other Expenses	
Instructor Notes:		Instructor Outline:
		I. Types A. Fixed - do not vary with production; no matter how much is used, these costs remain the same. 1. Examples: a. Administrative expenses b. Insurance c. Loan interest 2. These expenses are very difficult to chan e in a budget - you know how much they will cost, so you don't modify. B. Variable - vary with plant operation - the busier the plant is, the more they cost. 1. Examples: a. Electricity & other utilities b. Repairs & maintenance c. Transportation 2. These expenses are budgeted for just like other expenses discussed (materials & supplies; labor) II. Method A. Determine last year's cost by unit if possible. B. Determine increase per unit or in cost for last year (often only in percent) - average increase (change ÷ 2) C. Determine increased usage by using escallation factor. D. Increased usage + increased cost + last year's cost = Budgeted expense.

Module No: Finance Budgeting - 4	Topic: Other Expenses (con't.)	
Instructor Notes:		Instructor Outline:
		III. Summary A. "Other Expenses" budgets usually the first to be cut. B. Stay within limits. C. Ask questions.

EXAM QUESTIONS

FINANCIAL

Purchasing

I. Definitions:

1. Explain briefly the purpose of a work order. Examples may be helpful in your explanation.

2. What are several methods you might use to encourage employees to use work orders? Why might they work?

3. What is the specific function of a purchase requisition? How does this function differ from the functions of the purchase order and the work order?

4. Why is it important to use purchase orders every time you purchase materials and supplies?

II. Listing:

1. List at least five advantages of the work order system of materials distribution.
   1.
   2.
   3.
   4.
   5.

III. Completion:

On the following form, indicate whether the item listed in the left column appears on each of the forms in the remaining columns. If the item does appear, briefly explain its purpose on that form.

ITEM	WORK ORDER	PURCHASE REQUISITION	PURCHASE ORDER
1. date	yes no Purpose:	yes no Purpose:	yes no Purpose:
2. Manufacturer's item number	yes no Purpose:	yes no Purpose:	yes no Purpose:
3. item number	yes no Purpose:	yes no Purpose:	yes no Purpose:
4. item name	yes no Purpose:	yes no Purpose:	yes no Purpose:
5. description	yes no Purpose:	yes no Purpose:	yes no Purpose:
6. quantity used	yes no Purpose:	yes no Purpose:	yes no Purpose:
7. number/quantity needed	yes no Purpose:	yes no Purpose:	yes no Purpose:
8. order number	yes no Purpose:	yes no Purpose:	yes no Purpose:
9. job number or name	yes no Purpose:	yes no Purpose:	yes no Purpose:
10. authorization	yes no Purpose:	yes no Purpose:	yes no Purpose:

ITEM	WORK ORDER	PURCHASE REQUISITION	PURCHASE ORDER
11. suppliers/ sources	yes no Purpose:	yes no Purpose:	yes no Purpose:
12. address of supplier	yes no Purpose:	yes no Purpose:	yes no Purpose:
13. shipping address	yes no Purpose:	yes no Purpose:	yes no Purpose:

Purchasing Problem

Note to instructor: The following case has enough information in it to give your participants the opportunity to complete inventory cards, purchase requisitions, and purchase orders for various items of materials and supplies. If you desire, some of the information can be entered on the appropriate inventory cards and work orders in advance, leaving only the purchase orders and requisitions to complete. In any event, it is advisable to record the balance information on the inventory cards.

Case:

Your city has received an order from a new housing development to lay sewer pipe. The sewer tile will be 1,000 feet long, with a manhole every 333 feet. For each manhole, your employees will need two spacer rings, one manhole, and one manhole ring and cover. In addition, there will be eight connections of private sewer lines, all of which need tapsaddles.

On the attached work order, complete the necessary information for obtaining materials from the inventory. Check each item to the inventory card, making sure enough are in stock. If the withdraw of materials from the work order put the item below the economic order point, prepare a purchase requisition for approval by the board. Assume that approval is given for these items and prepare the appropriate purchase orders.

Information for Inventory cards:

Sewer tile - 8", 5-ft. sections
Item No. 4561
Quantity on hand: 1325 feet.
EOQ: 5,000 feet
EOP: 1,000 feet

Tapsaddle - 4"
Item No. 4782
Quantity on hand: 27
EOQ: 15
EOP: 15

Manhole rings & covers - 24"
Item No. 4791
Quantity on hand: 132
EOQ: 35
EOP: 125

Spacer rings - 4"
Item No. 4673
Quantity on hand: 345 rings
EOQ: 250 rings
EOP: 300 rings

Manholes - 48" barrel
Item No. 4790
Quantity on hand: 145
EOQ: 50
EOP: 150

Budgeting

I. Definitions:

1. What is the purpose of a budget? How could it help you as a plant manager?

2. What is "capital expansion"? How does it affect your budget, especially when you use historical evidence?

3. Why is it difficult to plan future expenditures for materials and supplies using only historical evidence?

4. Why is it important to include an escallation factor in budgeting for labor costs?

II. Listing:

1. List at least 10 different items of capital expansion which might have an effect upon budgeting.

1. 6.
2. 7.
3. 8.
4. 9.
5. 10.

III. Multiple Choice:

1. It is important in budgeting to look at events which have already occurred in order to determine their significance on what might happen. These events are termed:
   a. Averaging
   b. Historical evidence
   c. Escallation factors
   d. None of the above

2. In order to determine the amount to use as a value for an item or an expense, the price at the beginning of the year is added to the price at the end of the year and the sum is divided by two. This is called the:

   a. Average cost
   b. Historical evidence
   c. Escallation factor
   d. None of the above

3. Inflation must be considered when budgeting. When this inflation is a result of increased plant size or operations, it is termed:

   a. Averaging
   b. Historical evidence
   c. Escallation factor
   d. None of the above

Note to Instructor: Many objectives in this module lend themselves very well to oral evaluation. If written evaluation becomes necessary, essay questions are best.

Inventory:

I. Essay or oral questions:

1. Adeuqate inventory records are essential to a well-run operation. Defend this statement with at least two reasons.

2. Explain the concept of a perpetual inventory. You may compare it to periodic inventory.

3. Why is it important to record your inventory on an inventory card?

II. Multiple Choice:

1. When inventory is counted only occasionally, and estimates are made concerning the number of items available for use, the operation is said to use:

   a. perpetual inventory
   b. grouped inventory
   c. periodic inventory
   d. physical inventory

2. Sometimes small, similar items in inventory are recorded on a single inventory card. This method is called:

   a. perpetual inventory
   b. grouped inventory
   c. periodic inventory
   d. physical inventory

3. The time when it is most advantageous to order new items of inventory is:

   a. Economic Order Quantity
   b. Escallation Factor
   c. Economic Order Point
   d. None of the above

4. You must decide how many items you must pruchase in order to maximize the efficiency of your inventory. This is called:

   a. Economic Order Quantity
   b. Escallation Factor
   c. Economic Order Point
   d. None of the above

III. Listing:

1. List at least 5 advantages of a perpetual inventory over a periodic inventory when you use them for materials and supplies.

   1.
   2.
   3.
   4.
   5.

2. List at least two advantages and two disadvantages of purchasing from a single supplier.

   1. 1.
   2. 2.

3. List at least two advantages and two disadvantages of purchasing with a competitive bid.

   1. 1.
   2. 2.

IV. Matching:

1. Each of the items in the column on the left is explained in the column on the right. There is only one correct response for each item. Place the letter of the explanation on the line to the left of the item.

____1. item number	a. the day the item or items are checked out of inventory
____2. usage to date	b. the number of items which have been checked out this year
____3. sources	c. the number of items to order when your supply is low
____4. date used - number used	d. the information you can learn from the invoice
____5. date received - cost per unit - number recieved	e. the internal inventory coding used
____6. item name	f. a description of title of the item
____7. item specifications	g. the restrictions in size, shape, etc. which you must use to identify inventory items
____8. balance	h. a list of companies where the item can be purchased
____9. Economic Order Point	i. the number of items you must obtain
____10. Economic Order Quantity	j. the number of items you have

Below is a list of other expenses. Indicate on the line beside the expense whether it varies from year to year (V), or is fixed on a yearly basis (F).

_____Depreciation - building

_____Depreciation - Equpt.

_____Insurance

_____Materials and Supplies

_____Rent

_____Interest

_____Miscellaneous

Problems:

1. You have an item of inventory, X-15, which you order from ABC Supply Co., 123 Main Street, Anywhere, IA. Ordinarily it takes 5 weeks to get an order. Last year, you used 72 units of X-15 regularly throughout the year. What is the Economic Order Point?

2. In Problem #1, you also must pay $36 per order to ABC Supply, and it costs $2 per unit storage. What is the Economic Order Quantity?

3. Using Item X-15 from above, you feel that competitive bidding would yield a better per unit cost than purchasing from your regular supplier. How would you request competitive bids?

4. After completing Problem 3, you find your best buy is still from ABC Suppliers, at $13.20 per unit. Write a letter and order the quantity you determined in Problem 2.

Budgeting Problems

The following information is required in order to complete the problems below.

1. Capital expenditures for the past five years:

1976-77	$376,000
1975-76	345,000
1974-75	278,000
1973-74	229,000
1972-73	213,000

2. In planning, a remodeling of the downtown system will begin in 1978 and must be completed in 1979. The yearly cost is estimated to be $14,750.

3. There were no extraordinary capital expenditures in 1976-77.

4. For Material 713-A, there were 16,450 units used in 1976-77, and costs for this material were:

   7/1/76 - $3.05/unit
   6/30/77 - $4.18/unit

5. Total labor hours used, 1976-77 - 47,300 hours (including overtime).
   Average labor cost per hour - $6.87 (including overtime)
   New labor contract calls for a 6.3% increase.
6. The electricity costs for 1976-77 were $21,500. The rate has increased by 15.5% in the last fiscal year.

Problems:

1. Calculate the escallation factor, using the information above.

2. Using the appropriate information, calculate a materials and supplies budget for 1977-78.

3. Using the appropriate information, calculate a labor budget for 1977-78.

4. Using the appropriate information, calculate a budget for the variable expense, electricity, for 1977-78.

FT

PERPETUAL INVENTORY

1. KEPT ALL THE TIME--EACH TIME AN ITEM IS BOUGHT OR USED.

2. MUST COUNT EACH ITEM EVERY YEAR TO COMPARE REAL TO BOOK.

3. ALWAYS USE INVENTORY CARDS FOR EACH ITEM.

FT

PERIODIC INVENTORY

1. DONE ONLY OCCASIONALLY--USUALLY ONCE A YEAR.

2. ALWAYS DONE AT THE END OF THE FISCAL YEAR.

3. COUNT EVERYTHING.

FT

ECONOMIC ORDER POINT

1. LAG TIME BETWEEN ORDERING AND RECEIVING ORDER.

2. RATE OF USE PER YEAR.

FT

ECONOMIC ORDER QUANTITY

1. COST TO ORDER

2. COST TO STORE

3. RATE OF USE

$$\text{E.O.Q.} = \sqrt{\frac{2 \times \text{Annual Units Required} \times \text{Cost per Order}}{\text{Storage Cost per Unit}}}$$

FT

MAINTENANCE RECORD

DATE _____

LOCATION: _____ ITEM: _____

SERIAL NO.: _____ MODEL NO.: _____ SIZE _____

MFG: _____

_____

_____

MAINTENANCE PERFORMED: _____

_____

_____

_____

_____

_____

_____

PARTS USED: _____

_____

_____

_____

PERFORMED BY: _____

PARTS NEEDED OR ORDERED: _____

_____

ORDERED FROM: _____

_____

DATE ORDERED: _____ DATE RECEIVED: _____ DATE INSTALLED

_____ REG.NO. _____ INSTALLED BY: _____

PERPETUAL INVENTORY

Inventory is a perplexing problem; the more we work with it, the more there seems to be done. It is essential that each item in the inventory be controlled in order to maximize efficiency and minimize costs.

In order to substiantiate your expenses, you must match the cost of materials and supplies with your materials and supplies budget. Without adequate records, this would be impossible In matching these costs to the budget, you must also be careful to keep costs in the right fiscal year - that of the use of the materials. Inventory cards do that.

Inventory records also control your materials and supplies. When your employees know you keep careful track of what they use, they will be more careful. Each job also has the documentation necessary to prove its cost from inventory cards.

Almost all plants receive public funds for operating purposes. When you are responsible either to gavernmental agencies or the general public, you have an obligation to maintain adequate records. Often this obligation is a legislarive one.

The most common items in your inventory are materials and supplies used in the operation of the plant and ancillary services. It is these items of inventory which will be discussed in the following module. It should be clarified that the terms "materials" and "supplies" are very encompassing. In general, however, they refer to things which are consumed in the operation of the plant. It could be said that "materials" are used in plant and ancillary services maintenance - for instance, repair parts for pumps, etc. "Supplies" are consumable in and of themselves, rather than for repairs - for instance, chemicals for water treatment. However, some items, such as sewer tiles, could be used for either new construction or repairing old construction. That is why inventory is almost always grouped as "Materials and Supplies" rather than separated.

In keeping track of inventory you have two choices. The first choice is used often by private business concerns. It consists of counting inventory once each year, usually at the beginning of the fiscal year. This method of recording inventory is called Periodic Inventory because it is done periodically. In periodic inventory, the person or persons responsible for the inventory actually count each item in the inventory and record the amount or quantity of each item, plus its cost, on a list. When the total inventory has been counted, the total quantity and total dollar value of the inventory can be found by adding the lists.

Obviously, some items of inventory are virtually impossible to measure definitively. These items, such as liquids in a barrel, or lengths of pipe, may be estimated. However, these estimates must be made by a knowledgeable person so that it is as accurate as possible. In addition, many times an independent, uninterested person (often an auditor) is present at the time of the physical inventory to insure complete honesty.

A physical inventory - counting the actual number of the items in inventory - is the most important element in a periodic inventory. Indeed, in most businesses who use a periodic inventory, the physical inventory is the only thing that happens. Sometimes in a periodic inventory system the only way supervisors know how much inventory is left is when an employee needs some supply which is all gone! The physical inventory, in addition,

is a part of the other major method of recording inventory.

When every item of inventory is counted into and out of the inventory records, the inventory is considered to be a Perpetual Inventory. A separate record is kept for each item purchased, and each time that item is used in the operation of the plant, the record is changed. Therefore, on any particular day the person responsible for the inventory can say exactly what is on hand.

The advantages of the perpetual inventory are many; the most obvious is that you would always know how close you are to your operating budget. If some item of your inventory suddenly began to disappear, you could check on it right away. In addition, with a perpetual inventory it is easy to see when supplies are low; new stock can be ordered before you run out, which might cause problems.

A third advantage of perpetual inventory is its control over the stock. Most supervisors want to have the ultimate say over the use of supplies and materials, since they have the responsibility for the economical use of those supplies and materials. Also, a perpetual inventory encourages employees to be more careful with supplies. If they know they have to have each item taken out of inventory checked by their supervisor, they are less likely to use more than is necessary, to break or damage materials, or to "borrow" supplies for personal use.

One of the most difficult aspects of maintaining an inventory is planning for next year's consumption. With periodic inventory, you don't know until the end of the year exactly how much you have used, or exactly what you have left. That does not help much in planning! With a perpetual inventory, you can see on a monthly basis how much you've used, and estimate from that.

There are two distinct disadvantages of the perpetual inventory system. The first is that it does entail extra work, both on the part of the supervisor and on the part of the employee. The additional work, however, is far outweighed by the advantages it brings to the entire plant operation. The second desadvantage is one of personnel management; the supervisor must encourage his employees to maintain the system by completing the preliminary records necessary for its operation. With encouragement and careful explanation, employees can become enthusiastic about a perpetual inventory system.

Sometimes you might have small items of a similar nature as a part of your supplies. In addition, the quantities of these small items are so small that to keep separate cards, for each item would seem very wasteful. In that case, it is acceptable to group these items together in one inventory record. When you record inventory in groups, you are essentially maintaining a small section of periodic inventory in your perpetual inventory system, for you must still count items individually every year. It is important to remember that grouping can only work with items that are both small in number and small in cost.

Thusfar in the module, we have discussed how to keep track of numbers in inventory; perhaps mention might be made of the methods of valuing inventory. First, it is important to remember that any method of valuation is fine as long as you do all of the inventory the same way. Consistency is the thing to strive for.

You can value inventory at what it cost you on a unit-by-unit basis.

This is usually very easy for expensive, seldom-used items. (If you only had two during the year, and each one cost $500, it's not hard to keep track!) However, most people prefer to average the cost of all the individual items, and use the average cost as a guideline. For instance, if you bought 10-inch sewer tile as follows:

1000 feet	at $1.89/foot =	$1890
2000 feet	at $1.96/foot =	3920
1500 feet	at $2.03/foot =	3045
4500 feet		$8855

the average cost would be $1.968 per foot

If you buy supplies several times during the year, you must change your average cost each time, unless the change is negligible (less than 1% of the cost.)

This module should help you to understand why inventory is very important. You should know why a perpetual inventory is superior in most cases to the periodic inventory. In following modules you will learn how to keep the inventory cards that are essential to a perpetual inventory system, how to order materials for a perpetual inventory system, and how to plan for the future.

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FT-3

INVENTORY CONTROL RECORD

Spencer, Iowa

Date _____ 1972

Page _____ of _____ Pages

Department: _____ Division: _____

Item No.	Description and Identification	Where Located	Orig. Cost & Year	Condition Good, Fair, Poor	Replacement Value 1972	
						60
	59					
	F					

INVENTORY LEDGER

PART NUMBER

PART DESCRIPTION

DATE	REFERENCE	RECEIPTS		DISBURSED	LAST COST	BALANCES		TO DATE USEAGE
		ITEMS	INVOICE AMOUNT			ITEMS	AMOUNT	

ECONOMIC ORDER POINT AND ECONOMIC ORDER QUANTITY

In order to maintain adequate inventory records, you have learned how to use an inventory card. One of the advantages of using inventory cards is that you can use them to maintain the proper inventory level. Soon you will learn how to purchase materials and supplies, but in the module you will learn how much and when to order.

Some plants have adequate storage space for materials and supplies and order such items only once a year. However, frequently storage space is limited, and supplies must be ordered periodically during the year. The purpose of Economic Order Point and Economic Order Quantity are to determine the best time and best amount to purchase.

To determine the proper time to order, or the Economic Order Point, you must use two factors. First, you must determine the time span between ordering an item and its delivery. Then you must find out by estimating from previous usage how much of the item you need. With that information, you can order at a level to assure that you will never run out.

Example 1: It takes 4 weeks to receive any size order for 8" sewer tile, 5' length. You use, on an average, 500' per week for a city expansion project. You must order at least when your inventory reaches 400 tiles (5' length), or a total of 2000 feet, so that you have enough tiles to last while you are waiting for deliver. (100 tiles - 500 feet - per week for 4 weeks) Usually, to be safe, you would build in a safety margin - perhaps 50 tiles - to allow for breakage or delayed delivery. Therefore, your economic order point is 450 tiles. (When your inventory gets down to 450 tiles, you must place an order.)

The economic order point is entered on you inventory card, so that you can always see when it is time to order.

Several factors are used to determine economic order quantity. The first is the cost of the items to be purchased. Sometimes there are discounts for large purchases. If so, you will want to buy as many of that item as possible to take advantage of the maximum discount. Also, there might be costs in ordering such as minimum shipping charges or order charges, which might increase with more frequent orders. Additionally, there might be a cost for storing the materials. If the cost of storing the items is more than the discount, there's no advantage to buying more. The third factor to study is the rate of use of the item, or how many are used each year. The economic order quantity may be calculated by computing the combined costs of ordering and storing.

Example 2:

Material: 8" x 8" cap saddle
Units required during the year..... 1,200
Ordering cost per order placed..... $10
Storage cost per unit ..... $.60

Example 2 (con't.):

Number of Units	Number of Units Per Order	Average Units in Inventory*1	Order and Storage Costs		
			Order Cost	Storage Cost*2	Combined Cost
1	1,200	600	$10	$360	$370
2	600	300	20	180	200
3	400	200	30	120	150
4	300	150	40	90	130
5	240	120	50	72	122
6	200	100	60	60	120
7	171	86	70	52	122

*1 Average Units in Inventory = $\frac{\text{units per order}}{2}$

*2 Storage cost = Storage cost per unit x Average units in inventory.

You could use Example 2 and calculate many sizes of orders for each item in inventory; however, this would be extremely time consuming. There is a formula which you can use to calculate the economica order quantity.

Example 3:

$$EOQ = \frac{2 \times \text{Annual Units Required} \times \text{Cost per Order Placed}}{\text{Storage Cost Per Unit}}$$

$$EOQ = \frac{2 \times 1200 \times \$10}{\$.60}$$

$$EOQ = 40{,}000$$

$$EOQ = 200 \text{ units}$$

The formula might seem overwhelming at first, but once you've calculated EOQ, the calculations need not be made again for several years. Remeber, too, that storage costs aren't just costs you pay to someone else; they include costs you have at the plant for utilities in you store rooms.

Estimates for all of the information used to calculate both EOP and EOQ are possible, but must be reasonable.

Many plant operators would shudder at the extra time it takes to calculate accurately the proper time and proper amount to order. However, the effects of running out of an essential item of materials and supplies can be extremely costly in time and money. In addition, a large surplus of some item which uses valuable storage space needlessly can also be costly as well as annoying.

COMPETITIVE BIDDING VS. PURCHASING

In addition to studying the various methods of recording inventory, we have studied how to determine the time and the amount of each item to buy. Our assumption when we studied economic order quantity was that we had to buy materials and supplies several times during the year. Now we will study the several methods of determining who we should buy from.

With small, inexpensive items of inventory, plant policy is usually to purchase most conveniently, from a local supplier if possible. However, many supplies and materials can be purchased much more economically from large supply houses. There are two alternatives to determine which supplier to buy from.

One of the ways to prepare for purchasing is to ask several suppliers for competitive bids. Several factors must be considered when requesting bids. First, it takes organization to prepare lists of needs. You can use the bid method quite well at the beginning of the fiscal year when you must replenish your inventory of materials and supplies. Suppliers are given lists of all your needs and must, by some given date, respond with one price for your total list. Then you can determine which supplier will give you the best price.

During the year, the competitive bid method is also possible, but can be more difficult. Often individual items of inventory do not require orders simultaneously, so bids are on fewer different items. In addition, when you ask for competitive bids on the materials and supplies you need, you must remember that the time between your recognition of need and the actual delivery of those materials is extended.

The more common method of purchasing materials and supplies is by ordering from a catalog or price list. Each year suppliers furnish their catalogs and wholesale price lists; often in addition, salesmen from the various supply houses visit the plant occasionally. If you choose this method, you can record the various suppliers and their prices on the inventory card. Then, when you reach the economic order point, you can place an order for that one item of inventory which is low. The lowest price can be taken advantage of for each item of inventory.

There are advantages and disadvantages to both competitive bid purchasing and buying from suppliers by order. Most often a combination of the two methods can be developed to maximize efficiency and minimize cost. Inventory is always at a minimum at the end of the fiscal year, both because the fewer items there are in inventory the easier it is to count and because budgets for new purchases are expended by year end. Therefore, it is quite logical to use the competitive bid method to replenish the inventory. In addition, there are some items of inventory which need to be purchased only once or twice per year. These items could easily and conveniently be purchased on a bid basis.

The items in inventory which must be purchased on a frequent schedule would be awkward to purchase with bids, because you have more important things to do than to write multiple letters to suppliers requesting bids and suppliers would get disgruntled with trying to answer all those letters. These items could be ordered much more conveniently through the catalog and price list method.

No matter which method or combination of methods you use to determine from whom you will order, it is your responsibility to find the best supplies and materials for the best price. With some planning and organization on your part, you can make your job easier.

SMALL PLANT OPERATIONS

In the preceding modules we have discussed in inventory control concept. Part of this concept would seem to indicate a large plant operation with many employees. Just where does the small, one or two man operation fit into this concept?

Obviously, the checks and balances system to discourage employee pilferage is unnecessary if there are no employees. However, the organization and varification system is necessary no matter how simple or how complex your operation may be. Let us look at each of the procedures as it would apply to a small operation.

First, a perpetual inventory is best for any size inventory. In reality a small operation's perpetual inventory is more simple than a larger plant's, but run on exactly the same concept. The yearly physical inventory is part of every inventory system, too.

Inventory cards in a small plant very often are manual rather than machine or computer based. The inventory cards can be kept either by the plany operator or by the bookkeeper. It is essential in a small operation as well as a large one to keep careful track of inventory usage, for often small operations also have tight budgets.

Economic order point and economic order quantity can be a great help to small operators. Because they are small, they very frequently are not given order considerations as are large plants, so any money saved is a bonus. Also, inventory levels are lower, so proper ordering can be extremely important. Even if the economic order quantity is "guesstimated", it is still better to use some methodical method of ordering.

In a small operation, the ability to buy in quantity on a bid basis can be extremely advantageous. This concept should be reviewed before it is eliminated as a possibility. The purchase through a catalog can be facilitated with inventory cards.

As a small plant operator, you could very well be guilty of one major fault: a one-person management system. All of us have a tendency to neglect steps and written documentation if we're the only person involved. When you look at an inventory system, you might think that it is unnecessary to do all that paperwork, because you know what's going on. However, an "in-head" inventory system can become chaotic. For instance, if you quit your job, who could possibly take over a system that was not carefully organized? Also, for your own protection, you should be able to prove every element of your operation. Without a well-documented inventory system, you do not have that proof.

Most systems become far easier once you start. In a small operation, the evidence of a good, reliabe inventory system will substantiate your abilities and prove your management capabilities.

MAINTENANCE RECORD

DATE _____

LOCATION: _____ ITEM: _____

SERIAL NO.: _____ MODEL NO.: _____ SIZE: _____

MFG: _____

_____

_____

MAINTENANCE PERFORMED: _____

_____

_____

_____

_____

_____

_____

PARTS USED: _____

_____

_____

_____

PERFORMED BY: _____

PARTS NEEDED OR ORDERED: _____

_____

ORDERED FROM: _____

_____

DATE ORDERED: _____ DATE RECEIVED: _____ DATE INSTALLED:

_____ REG. NO.: _____ INSTALLED BY: _____

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DATE _____

NO. 24695

PERSON RECEIVING CALL _____

ACCT. NO. _____

TIME CALL RECEIVED _____

EMMETSBURG MUNICIPAL UTILITIES
2011 MAIN STREET
EMMETSBURG, IOWA 50536

SERVICEMANS NAME _____

JOB ARRIVAL TIME _____

NAME: _____

JOB DEPARTURE TIME _____

GAS ☐ WATER ☐ SEWER ☐

COMPLETE EXPLANATION OF WORK PERFORMED _____

METER READINGS: GAS: _____ WATER: _____

QT.	CODE NO.	DESCRIPTION OF MATERIAL	UNIT PRICE	TOTAL PRICE
	68			

NAME	M	T	W	TH	F	S	TOT HRS	RATE	TOTAL
TOTAL									69

DATE ORDERED	ORDERED FROM	ITEM ORDERED	REQ. NO.	DATE REC'D.

PURCHASE ORDER
~~REQUISITION~~

CITY OF SPENCER, IOWA

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FUND: _____ 19

SUPPLIER: _____

ADDRESS: _____ № 21701

Please furnish us with the following:	
Void	$
	$
	$
	$
	$
	$
	$

Attach requisition to your itemized invoice and submit last Friday of each month.

City of Spencer
By _____
(Authorized Signature)

BUDGETING - CAPITAL EXPANSION

When someone says "budget", everyone has an idea of his own about how to do a budget and what should be in that budget. In school, children learn to budget their own money in the hope that some day those lessons will apply to their adult life. However, most of us ignore the practicality of budgeting. Budgets are essential in every phase of life, both personal and professional, if true growth is to achieved. Let us review some of the basic purposes of the budget.

A budget, most importantly, is an estimate of the future. Usually a "budget" is for one year or less. "Planning" or "forecasting" is budgeting for a long term, often five or ten years. Businesses must estimate many operations for the future. A goal-oriented operation is so as a result of careful budgeting, because goals are plans for a better future. A profitable operation is one which has budgeted income and expenditures accurately, and has lived within that budget. A good manager is one who can budget responsibly and who can relate that budget to his employees so that everyone has a sense of responsibility in spending money.

Most governmental operations have very stringent rules and restrictions regarding format and the reporting of budgets to the county, the state, and federal organizations. In addition, revenues for budget purposes are determined by city clerks or utility accountants, and managers have very little control over estimating or budgeting revenues. Therefore, budgeting revenues will not be an element of this submodule.

All budgeting is concerned with money; in accounting terms, you budget by employing cash flow to determine profitability. It is necessary to budget in this manner because, as a public utility, your revenues are fixed. You can't become more profitable by making more of a product to sell, as can a manufacturing company. With only so much money, it becomes your responsibility to divide that money into several areas of expenditures. Among those areas are capital expansion, materials and supplies, labor, and other expenses. This unit will review capital expansion. "Capital expansion" can include a multitude of ideas, but should be considered as the increase of income-producing assets in order it increase revenues. In addition to its effect upon revenues, capital expansion has repercussions upon expenditures, also.

Capital expansion can be large, involving several years for completion, or of a short term in nature. In any event, capital expansion should be planned on a long-term basis. The basis of this estimate is history; what has happened in the past usually has an effect upon the future. The further ahead you want to plan, the further back you must look to see trends and growth factors. First, determine a rate of capital growth on a yearly basis by determining a percentage increase per year for the past years. This percentage increase can be the basis for your estimate of capital expenditures. Then you must determine what specific information you have about next year which might affect capital expenditures. For instance, if you know a new manufacturing company will complete a 1,000-employee factory, you must plan for the factory plus housing for new employees. Then you must determine if these specific items will be a continuing factor or will be for only one year. If it has long-term use, the capital growth must be considered permanent and be a part of the percentage of growth as calculated historically. However, some capital expenditures have impact only for one year. For instance, replacement of existing facilities has

no growth factor, so caosts do not increase revenues. Obviously, in order to include any future growth in your estimates, you must have a good working relationship with those people who control planning.

You've looked into the future to see what might have an impact upon capital expenditures; however, one thing you must not forget is the past effect of capital expenditures. Your basic expenditures estimate is on an historical growth factor. Now you must look in the past and see if there are any extraordinary expenditures which have no effect upon the present or the future. For instance, any extraordinary replacement costs last year should be subtracted from capital expenditures for this year. Extraordinary items must only have an effect upon one year, of they will become a part of the average growth factor.

Let us review the steps to follow in budgeting for capital expansion:

1. Determine capital expenditures for the past several years (perhaps five). Determine the increase each year, and calculate an average percentage growth per year. Extend that percentage of increase to next year by taking this year's capital expenditure times the percent.

2. Check the general plan for the next year to determine any new expenses which are planned. Determine the estimated cost of any new expenditures; are they routine, so that they are in the general increase, or are they extraordinary, so that they must be included? Add any increase to your base figure.

3. Check last year's capital expenditures; was there any extraordinary expense which must be omitted from this year's figures? Subtract any extraordinary increase from last year.

4. Find the new total, subtract last year's expenditure, and get a percentage change -- this is your escallation factor.

Your capital expansion budget is calculated. Remember, any budget is an estimate; you must use your knowledge of plant operations to determine what is an extraordinary expenditure. A layman could not build a budget for a utility. Your careful judgement is your greatest tool.

Example:

1. Capital expenditures for past 5 years

1976-77	$287,000		
1975-76	264,000	8.7%	
1974-75	256,000	3.1%	average = 8.55%
1973-74	231,000	10.8%	increase
1972-73	207,000	11.6%	

Estimated increase	287,000 x 8.55% =	$ 24,538.50
		287,000.00
Base for projection, 1977-78		$311,538.50

2. In planning, a new subdivision will begin suilding in 1977-1978, and new pipes, etc., must be completed by 1980. The yearly cost is estimated at $11,500. - Add to base - $323,038.50

3. In 1976-1977, completion of a general repair program was achieved. This repair program cost $20,540 last year - Subtract - $302,588.50

4. $302,588.50 - budgeted capital expenditures
   287,000.00 - last year's expenditures

   $ 15,558.50 - capital expansion, 1977-78

   $\frac{15,558.50}{287,000.00}$ = 5.4% escallation factor

BUDGETING - MATERIALS & SUPPLIES

Materials and supplies are the backbone of any plant's operation; when you budget for materials and supplies, you have a great responsibility. There are three elements to budgeting for materials and supplies. The first element to consider is historical evidence.

Your basis for budgeting for materials and supplies is looking at what you've used this year. With good inventory records, you will know exactly how much has been used this year, both in numbers and in cost. The easiest budget is to extend those figures to next year. However, last year's figures aren't enough.

The second element in budgeting for next year is to look at the difference in average cost at the beginning of the year and at the end of the year. That is the increase in average cost throughout the year and must be extended to next year. In other words, each unit that you use next year will probably cost more than it did this year.

In Unit 1 of this submodule, you learned how to budget for capital expansion. You will use this figure, as a percent, as an escallation factor in budgeting for materials and supplies. For instance, if your capital expansion is 20%, then you must use 20% more materials and supplies in order to maintain the new assets. Therefore, when your plant grows, you must increase the number of units of materials and supplies.

Let us review the steps in preparing a materials and supplies budget:

1. Determine how much you used last year, both in units and in cost.

2. Determine the increase in cost for each unit during the past year and extend that cost for next year.

3. Use the percentage increase in capital growth for next year and use that percentage to determine the new number of units which are estimated for next year.

4. Multiply the estimated number of units by the estimated costs in order to get the budget figure for the year.

The materials and supplies budget nust be done by an expert, as all other budgets. A knowledgeable person must always look at the budgets to see if they "look right". The materials and supplies budget is seldom precise, but must be close enough so that the budget is neither so large that you have things you don't need or want, or that you run out before the end of the year.

Example: Material XZ-7

1. Usage in 1976-77 23,560 units - $49,790

2. Cost per unit, 7/1/76 - $1.87 cost per unit, 6/30/77 - $2.26
   increase - $.39 average for year - $.19 + 2.26 = $2.45

3. Capital increase - 5.4% x 23,560 = 1,272 units
   23,560
   24,832 projected usage

4. Projected usage x average cost increase
   24,832 x $2.45 = $60,838.40
   % increase - 22.2%

BUDGETING - LABOR

Labor is usually the easiest part of your budgeting tasks, because it is the most certain in the long run, and also often the part over which you have the least control. Again, you must review the three elements of budgeting.

First, you must look at historical evidence. How much labor was used, in hours and in cost, last year. When we look at labor hours, we must assume that your employees are paid by the hour, with overtime elements to consider. You should use the previous year's hours and rate for next year's basis.

If your employees bargain collectively, you probably will know in advance how much the increase in per hour rate you must budget for next year. If your employees' salaries are increased independently, it is still likely that you will know some time in advance what the increase will be. If you have no other source, you can use the average rate of inflation as an estimate.

Your other worry for estimating labor costs is the number of hours used. Capital expansion might increase the total number of jobs, so you can estimate an increase in hours by an increase in men. Additionally, any increase in jobs to do can increase the hours it takes to do them. This increase in hours might be smiply estimated by using the percentage escallation factor.

It is impossible to budget accurately for labor needed for emergencies; however, some "buffer" could be added to labor estimates to take emergencies into account.

To review labor budget steps:

1. Determine labor hours and costs used last year.
2. Calculate the increase in cost per hour from new labor contracts.
3. Determine the increase in hours worked using the escallation factor.
4. Multiply the new labor cost per hour by the increased number of hours to be used.

1. Total labor, 1976-77
   hours - 42,000 hours (including overtime)
   avergae cost per hour - $6.43 (including overtime)

2. New labor contract settled at 6.2% increase
   6.43 x .062 = $ .40
   6.43
   $6.83 per hour

3. Capital increase 5.4% x 42,000 hours = 2,268.00
   42,000.00
   $44,268.00

4. Estimated hours x New labor cost
   44,268 x $6.83 = $302,350.44
   %increase = 11.9%

BUDGETING - OTHER EXPENSES

In budgeting for expenses, you must first analyze those expenses. Some expenses remain relatively static through the year; no matter how much capital expansion occurs, you don't have more expense. For example, you are probably responsible for a certain percentage of administrative expenses, including city clerks, accountants, and other office help. No matter how much other work you must do, your percentage probably won't change. Many other administrative expenses remain fixed for the year, regardless of operations. Obviously, these expenses are very easy to budget because you know from year to year exactly what you must spend. Commonly, these expenses are called Fixed Expenses.

Other expenses, such as materials and supplies and labor, vary as plant operation and capacity vary. There are various expenses, particularly maintenance-type expenses, which also vary with operations. Commonly, these expenses are classified as Variable Expenses. They must be budgeted on an estimated basis, because we must estimate production for the year.

Variable expenses must be budgeted in much the same manner as the other expenses we ahve discussed. The following steps should be followed:

1. Determine the expense for last year, in cost and by unit if applicable.
2. Determine the increase in cost last year from beginning to end of year. Average that increase and add to last year's cost. (You might have to trace increases to bills)
3. Use the escallation factor to determine an increase in usage for next year.
4. Add the increased usage to the increased cost to get the budgeted figure.

Example:

1. Variable expense - electricity - cost was $17,350 for 1976-77.

2. Rates have increased 13% in the last fiscal year.
   13% ÷ 2 = 6.5% average
   6.5% x $17,350 = $1,127.75 increase in cost

3. Escallation factor 5.4% x 17,350 = $936.90 increase in usage

4.
   $17,350.00 - last year's expense
   1,127.75 - increase in cost
   936.90 - increase in usage

   $19,414.65 - budget amount

Summary: It is entirely possible to build a budget, using cost increases (inflation) and plant growth (escallation), and find your new budget far exceeds funds available. In these times, this is more often the case than not. Then it becomes your obligation as a manager to see where you can afford to cut. Usually you can't decrease the labor budget without firing an employee; the materials and supplies budget, if inventory is accurate, is a necessity. The capital expansion budget cannot be cut without jeopardizing income-producing growth. Therefore, the "other expenses" budgets are the first to suffer. Don't assume that just because you need more money, you'll get it. You must live within bounds.

Budgeting can get extremely technical; every accounting text has pages outlining budget procedures. Essentially, however, a good manager learns to instinctively tell which expenses must increase and which must remain the same. This instinct takes time, effort and careful thought on the part of the manager. Don't be afraid to ask "old timers" how they do it.

FT-11

PURCHASE REQUISITION
City of _____

Date_____

The following item in materials and supplies inventory is below the reorder point.

Inventory No._____ Name_____
Description:

Number now on hand:_____ Economic Order Quantity:_____

Suppliers:

#1 - _____ #2 - _____

_____ _____

_____ _____

_____ _____

Requisitioned by:_____ Authorized by:_____

FT-13

No._____

CITY OF _____
PURCHASE ORDER

Date:_____

To: _____

Shipping Address: -

_____

_____

_____

_____

_____

_____

_____

ITEM NO.	NAME - DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL COST

Ordered By:_____

Authorization:_____